CARTOGRAPHIC STYLES: CRITERIA AND PARAMETERS

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ABSTRACT
The paper summarizes the research on stylistic characteristics of modern maps carried out in Vilnius university. We argue that the concept of style is applicable to every type of maps and that deliberately developed style is important not only for aesthetics of map image but also for better perception of geographic data on maps. Cartographic stylistics can complement and extend classical cartosemiotics with insights on how to assure that all elements of map support appropriate perception of the map information by its target group. Application of consistent stylistic rules can significantly improve the quality of cartographic communication. The same basic principles apply to digital maps and web services where the standard of cartographic design is still quite low. The structure of style is rather complex and difficult to formally define. Style can be influenced by geographic space, time and culture. National and regional cultures have certainly made impact on the historical cartographic representations. Culture of an organization, company or author can form individual style that reflects its values, goals and other specifics of thinking. We have identified the three major fields where presence of style improves map quality: identification (style allows for positive identification of the author and culture), information, (additional social and emotional messages) and integration (style as an organizing framework). Assuming that divergence of styles directly depends on allowed level of freedom of graphic expression, it can be stated that there are two large groups of maps that require different approach of stylistic analysis: reference maps with high level of standardization and thematic maps. Stylistic elements vary much less and are more difficult to identify within the first group. However, as topographic maps utterly and metaphorically represent the state, their stylistic quality is important at national level. It is possible to outline some objective factors that restrict use of possible stylistic solutions: purpose, target group and media. Three largely independent criteria, that can apply to different map components separately, but, on the other hand, combine composition and other aspects into one system, can be described as decorativeness, expressiveness and originality. Considering differences between the maps, the values of stylistic criteria should not be absolute, but relative to two neighbouring reference standards of each purpose-oriented group: ‘minimal map’ as stylistically indifferent sample and ‘standard map’ that is designed used minimum graphic enhancement necessary to meet basic criteria of communicative quality, i.e., one step ahead of the ‘minimal’ map. Four major groups of styles have been defined by general degree of graphic enhancement of visualised data: ‘minimal’ (no enhancement, ‘standard’ (small-scale enhancement), conventional (moderate enhancement, a few sub-groups) and conspicuous (significant enhancement, a great variety of individual styles). Within the last two groups, several more concrete style types such as laconic, constructive, expressive, lightsome, aggressive, soft, antique, luscious, extravagant and artistic are defined. A set of tourist maps were located in a stylistic co-ordinate system based on the three main criteria that allow to describe several trends of the prevalent conventional style.

KEYWORDS
map, cartography, style, stylistic analysis, visualization

INTRODUCTION
In one of his essays Evelyn Waugh has pointed out clarity, elegance and individuality as three essential elements of style and provided the simple definition: ‘Style is what makes the piece memorable’. So how many memorable pieces could be found within the stacks of maps, used daily by almost everyone? Perhaps just a few – the historical ones or successful imitations of them, maps with exceptional content and unconventional representations. And in most cases it is only due to uniqueness of the product, but not to exclusive elegance of its design. We have to admit that elegance is a practically indefinable quality, but it somehow reflects itself in overall harmony of visualization and contents. Due to this quality some old maps look surprisingly modern while most of modern maps do not. Almost everybody sufficiently involved in the production or use of maps will agree that a concept of style is in one or another sense applicable to a map. Confusion begins when we try to define what map style really means. Usually style is defined as a specific manner of expression, a quality, that characterizes belonging to a particular period of time, school or group (Gant and McIver Lopes, 2005). Such quality is present in different means of communication, such as verbal communication,
music and communication related to the sense of sight, to which maps belong as well as paintings. But everything is different when style is mentioned in the IT context. The first association conjured up will likely be Cascading Style Sheets, or, if closer to geographic information and maps as its visualizations, Style Manager or some similar tool of a GIS software. Finally, there is also a common understanding of style as a fashion, usually associated with good taste and refinement. So which of these three meanings are we dealing with in cartography?

Among a variety of publications where cartographic style has been referred to, we have not managed to discover a systematic approach that would be also practically applicable for classification and for further stylistic analysis. Thus we have tried to outline the main parameters that can be used to determine, evaluate and/or implement a consistent map style. The goal of this paper is to propose a structured framework for identification of modern cartographic styles. It is represented as a ‘coordinate system’ containing just three largely independent parameters. The proposed framework and definitions of particular styles are based on cartiosemiotic analysis of several hundreds of modern printed and electronic (Viliuvienė, 2006) thematic maps and appears to be exhaustive.

**MANIFESTATION OF STYLE IN CARTOGRAPHY**

Style in modern cartography can be defined as a loose framework that organizes all cartographic expression devices, is used distinctively and can be identified as belonging to particular region, cartographic edition and/or map producer. It is only possible to speak of style when parameters of such framework can be described and have same or similar values in at least several maps. Absence of style in this context means that method of use of different graphic attributes is rather haphazard and vary across the analyzed series of maps.

Style is not only perhaps the most important concept of map aesthetics, but also a factor that significantly impacts on quality of cartographic communication (Pravda, 1977, Bertin, 1979, Liutyi, 2002). It is the result of evolution and augmentation of cartographic visualization.

The structure of style is rather complex and can be influenced by geographic space, time and culture. Historical maps usually reflect general art styles of corresponding epochs. The traditional (baroque, Renaissance) graphic design styles can be easily identified not only by the graphic devices of the map image, but largely by ornaments, composition and elements of layout. Digital technologies open new graphic and interaction possibilities thus marking a new epoch in cartography. However, not only the mainstream art style, but also prevailing designers’ approach to cartographic communication (Figure 1) form an epoch-specific styles of maps.

Geographically, national and regional cultures have to a certain extent made impact on the cartographic representations, especially on the historical ones. Nowadays it is not so easy to identify a map as designed in a particular country or region, but in some cases reasonable assumptions can be made.

Culture of an organization, company or author can form its individual style that reflects its values, goals and other specifics of thinking. It takes a lot of time and efforts to develop a good individual style. That is the reason why smaller cartographic companies often follow or simply imitate style of maps published by the reputed companies.

Importance of style in cartography is hardly disputable. We have identified the three major fields where presence of style improves map quality.

- Identification. Style allows for positive identification of the author and culture.
- Information. A significant part of stylistic devices are not neutral but carry additional social, emotional and aesthetic messages that maps can convey. Besides that, style allows to make assumptions concerning map target group. N the other hand, if the style is actually compatible with perception specifics of the target group, it improves map communication. Whereas reading and interpretation of common map information takes some time, style is evaluated immediately and can give a user a good idea about the value of the map.
- Integration. A well thought-out style makes general idea of the map reflect on its every detail thus serving as a strong organizing framework. It guarantees wholeness of the product.
Modern maps, that are designed, stored and often used in digital form, still do not have specific stylistic tradition. In this paper we will not concentrate on digital representations that on one hand surrender to the limitations of various displays, but on the other hand have almost unlimited possibilities of animation, interaction and other qualities.

These qualities of digital maps require different approach and new extensions of traditional (if it exists in cartography at all) stylistic analysis. Thus we will concentrate on static representations (printouts or raster images) and try to define the main characteristics that allow for identification of such representation as belonging to one of the general visualization styles.

More formally, we define cartographic style as a set of parameters, part of which are determined by the map scale, theme and general purpose whereas the rest of them are subject to the designer’s free choice.

The purpose of cartographic stylistics is to assure that all elements of visualization consistently support appropriate perception of map information by the target group. It is worth mentioning that ‘appropriate’ does not necessarily mean ‘correct’ or even ‘most efficient’, but rather that user’s mental image of the map is close to the mental image the cartographer intended to convey. Maps often carry emotional contents. Sometimes they are designed with a purpose to distract attention from particular objects of geographic reality they represent or to create a false impression about the correctly represented phenomena in the other ways. Obviously such differences between represented reality and mental image is normally not the case with topographic maps, charts or other maps whose whose principal purpose is to accurately portray the features of the earth's surface. But regardless of high standardisation such maps can significantly differ (Figure 2). There is a general trend that more and brighter colors and lighting/shading effects are applied to modern maps. Unfortunately, the older maps, although less eye-catching, often are stylistically more consistent and pleasant to use for a longer time. Apparently importance of style grows in proportion to the diversity of graphic attributes and number of their values applied for cartographic visualization.

Assuming that divergence of styles directly depends on allowed level of freedom of graphic expression, it can be stated that there are two large groups of maps that require different approach of stylistic analysis.

1. General reference maps that provide extensive close-up detail. Accurate and homogeneous representation of real world objects, large scale and high level of standardization are typical for these maps. Topographic maps, charts and some large scale thematic maps (e.g., geological) certainly belong to this group.

2. Thematic maps that contain specific information about particular locations and/or spatial patterns. Such maps usually are compiled at smaller scale, do not have strict visualization standards and often contain sets of conspicuous objects (an element of advertising).
Fig. 2: Fragments of 1:50,000 topographic map sheets

It is evident that stylistic elements vary much less and are more difficult to identify within the first group. However, it does not mean that map stylistics should be limited to thematic mapping. As topographic maps utterly and metaphorically represent the state, their stylistic quality is important at national level. Unfortunately there is a general lack of studies on map stylistics as well as of consistent practical recommendations for improvement of cartographic style. In the best case single chapters or paragraphs by various authors have touched this subject, mainly discussing impact of epoch style on historical maps or impact of modern technology on the modern ones.

Perhaps the most consistent ideas on map stylistics can be found in works of Lithuanian cartographer M. Dumbliauskienė who has examined style as a component of cartographic design within the framework of cartographic communication (Dumbliauskienė, 2002, Dumbliauskienė and Kavaliauskas, 2004). Unfortunately, only a small part of this research has been published in English. She has developed a set of purpose-dependent stylistic criteria that can be used for evaluation of communicative quality of individual maps: level of cartographic expression, level of generalization, level of regulation, expressiveness and strength of emotional impact. Even though we do not completely agree with all her ideas, our hereafter presented model is related to at least some of the proposed criteria.

FACTORS THAT INFLUENCE MAP STYLE

Maps are products of science, technology and art. The concept of style applies to map design, which is usually associated with the ‘artistic’ part of this triad. It allows for stylistic analysis of maps as pieces of art. Nevertheless, map design is closely related and often largely determined by the technology used to make the map and by the specifics of data that are represented on the map.

It is possible to outline some objective factors that restrict use of possible stylistic solutions. For this we have used a simple but comprehensive framework for cartographic visualization that has been suggested by H. Schlichtmann (Schlichtmann, 2002). It is based on three main functions of with cartographic transcription: signification, clarification and emphasis. Signification is about correct visual representation of map informations, especially of hierarchies or other complex systems. Clarification is about making visualization easy and convenient to use. Emphasis means that a part of map information may serve a background for some objects of particular interest, that are graphically highlighted.

Purpose. Map purpose influences not only the choice of map contents, but also projection, scale, level of generalization and layout. For example, nautical charts are usually designed using Mercator projection that preserves direction and shapes. However, it would not be a good choice for a purpose that includes correct representation of size (e.g., general political map). Metro maps do not require consistent scale and are not split into sheets in contrast to inventory maps. Maps that must first of all convey large volume of precise data necessarily contain many various objects and almost all graphic devices are employed to convey significant information (attributes and relationships), thus leaving no freedom for additional expression and no much space for decorations. On the other hand, maps designed to be specifically noticed or memorised, require expressive design.

We have identified several general purposes that differently influence map style.
1. **Inventory and navigation maps.** Due to characteristic standardization and accuracy requirements this purpose allow very little freedom of stylistic expression. Unusual, extravagant graphic solutions are not acceptable. Within this group, signification function prevails.

2. **Orientation maps.** This is a large group of maps with strong clarification function. Clarity is an important issue. Nowadays, when maps are already so complex and become increasingly interactive, ease of reading is likely the best thing a cartographer can give to the user. It is often said; the better the design, the less it draws attention to the design itself. Clarity means that the map reader can easily move along, picking the information he needs, not bothered by that what he does not want at the moment but having it conveyed when he wants more, avoiding confusion. Decoration and emotional involvement are subordinate to the function, which must dictate the form. Excessive use of graphic devices is not desired unless they are necessary to emphasize particular entities or to prevent from possible interpretation errors.

3. **Thematic maps with primary purpose of visual communication.** Here emphasis plays an important role and good style means that methods of emphasis are regular and uniform over all the map or map series. More sophisticated graphic solutions are often appropriate. This very large set of maps can be roughly split into three smaller groups corresponding to informing, training and advertising missions. *Correspondingly, importance of attractive emphasis is higher for each of these subgroups. Nevertheless, good style always remain functional and this rule should never be forgotten.*

**Target group.** Maps of the same purpose require different style for different audience. Visually impaired people and children are typical examples. While the former need specific color solutions, the latter need decorations, attractive and recognizable objects.

**Media.** Even though modern publishing and presentation technologies are quite flexible, technological limitations still exist. To make a complex map look aesthetic (and in many cases simply avoiding information loss), black and white, grayscale and color outputs may be designed in different styles. Very small fonts, thin lines or pale subtle colors would not be readable on maps, presented exclusively on computer screen. A map with just a few large objects, that may appear rather stylish on a large screen, would be very inconvenient to use for mobile devices. By the way, not only limitations but also additional space for stylistic variations is due to modern technologies. Three-dimensional, interactive, animated maps require an extended stylistic framework, connecting style of traditional graphic devices with, for example, a style of 3D lighting or a style of map objects behavior (MacEachren and Kraak, 2001).

**STYLISTIC CRITERIA AND PARAMETERS**

Speaking of different styles we will try to eliminate impact of the factors listed in the previous chapter. Partially for this reason, but also because of unavoidable subjectivity of evaluation, values of stylistic criteria will not be absolute, but relative to two neighbouring reference standards of each purpose-oriented group (Figure 3):

1. ‘minimal map’ as database visualization using common schemes, i.e., stylistically indifferent sample;
2. ‘standard map’ that is designed used minimum graphic enhancement necessary to meet basic criteria of communicative quality, i.e., one step ahead of the ‘minimal’ map.

According to M. Dumbliuskiene, stylistic criteria are: graphic expressiveness, generalisation, standardisation, illustrativeness and strength of emotional impact. Also composition is described as a specific group of criteria that includes scale, proportions, color scheme, accentuation and general layout.

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**Fig. 3: ‘Minimal’, ‘standard’ and ‘stylish’ (from the left) map samples**

From our point of view, some of these abstract criteria cover same aspects of map stylistics (for example, use of a particular color scheme results in accentuation or deviations from standards) and some, such as
‘emotional impact’ or ‘general layout’ are too abstract to be evaluated. Therefore, identification of map style requires a set of more formal and more independent parameters. We propose only three basic largely independent criteria, that can apply to different map components separately, but, on the other hand, combine composition and other aspects into one system (Figure 4).

1. Decorativeness. Roughly speaking, this parameter describes amount of work applied for making map or its component specifically beautiful. Decorativeness manifests in eliminating imperfections of visualisation (for example, hydrography linework is approximated by splines, position of letterings is adjusted manually, polygons made transparent etc.) and in addition of graphic devices that normally do not convey additional information, except of subjective impressions generated by associations. For example, Greek or baroque patterns can be used for map frames. However, three-dimensional drawings of buildings in city plans or of other spatial structures should be classified as decorative even though they mainly serve the purpose of clarification. This parameter covers illustrativeness, (partly) standardisation, strength of emotional impact and accentuation from M. Dumbliauskienė’s set.

2. Expressiveness. This parameter describes the components that are intentionally designed as conspicuous (not necessarily beautiful). Both graphic expressiveness and strength of emotional impact from the previous set are directly related with this parameter, whereas scale, proportions, color scheme and generalisation largely depend on it. Expressiveness manifest in bright colors, interesting patterns, images, large texts and signs, thick lines, excessive generalisation.

3. Originality. Amount of unusual visualisation solutions (they can increase or not increase decorativeness and expressiveness) is strongly related with style. Originality means the degree of deviation from standard visualisation schemes for a particular map type. It can be observed in entire map (e.g., oval layout), its objects (inverse colors, distorted shapes, unexpected fonts, artistic effects) as well as in cartographic base components, such as a grid of unusual map projection, inverse orientation, varying scale. Nevertheless, it is difficult to formalize as graphic solution, once seen or described, loses its uniqueness. Parameter of originality is related with all of the abstract criteria.

The criterion of stylistic consistency may be added to this system for verification and for identification of the case when emphasis plays a significant role and big differences in parameter values across the components does not mean absence of uniform style. It corresponds to the abstract criterion of accentuation. Strong emphasis is used, for example, in advertising maps and makes it difficult to identify their style. Therefore we exclude this group, as well as maps, designed to meet the needs of specific target groups, from further analysis in this paper. In general, methods and styles of accentuation require a separate analysis.

Inconsistency of manifestations of the first three parameters usually means that the style is not sustained and higher parameter values are sporadical.

Fig. 4: Samples of street maps with one prevalent stylistic parameter

The framework connecting these stylistic parameters with standard map components, oriented to classical media (printed or non-interactive screen image) and main indications for each parameter are presented in the Table 1.

If consistent use of graphic expression is observed, it is possible to identify the type of map style. The following table (Table 2) shows tentative relationship between possible combinations of ranged parameter values and the strength of stylistic expression.
Table 1: Stylistic parameters and their indications

<table>
<thead>
<tr>
<th>Parameters Components</th>
<th>Decorativeness</th>
<th>Expressiveness</th>
<th>Originality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lines</td>
<td>resembling natural shapes and patterns (associative) • decorated</td>
<td>• generalised • thick • vivid patterns • shadows • artistic effects</td>
<td>• unexpected patterns</td>
</tr>
<tr>
<td>Colors</td>
<td>• harmonious • nuanced • contrasting</td>
<td>• pronounced • dark • contrasting • discordant</td>
<td>• inverse • unexpected</td>
</tr>
<tr>
<td>Textures</td>
<td>• transparent • artistic effects</td>
<td>• irregular • rough</td>
<td>• unexpected effects</td>
</tr>
<tr>
<td>Conventional signs</td>
<td>• associative • decorated</td>
<td>• prominent • sketchy • 3D effects</td>
<td>• unexpected associations</td>
</tr>
<tr>
<td>Lettering</td>
<td>• decorated • artistic effects</td>
<td>• prominent • unusual orientation • 3D effects</td>
<td>• unique fonts • unconventional orientation</td>
</tr>
<tr>
<td>Supplementary components (title, grid, frames, scale, north arrow)</td>
<td>• decorated</td>
<td>• prominent • sketchy</td>
<td>• unconventional • unique</td>
</tr>
<tr>
<td>Composition</td>
<td>• balanced • decorated</td>
<td>• assymmetric • simplified</td>
<td>• unconventional</td>
</tr>
</tbody>
</table>

Table 2: Stylistic parameters and stylistic expression of maps

‘Minimal’ maps themselves are not of interest for stylistic analysis. They are identified mainly by absence of any graphic enhancement and inadequate generalisation. Possible presence of expressive details is in this case due to the ready-made visualisation schemes or simply incidental. The only rare case when it is
sensible to speak of the ‘minimal’ style is when it is intentionally applied to invoke ‘technocratic’ associations.

We assume that presence of even a few components of original design or recognizable decorations and/or accents separates ‘standard’ maps with little freedom of graphic enhancement from the maps with larger freedom of expression.

For Standard visualisations that basically correspond to topographic (inventory) and navigation maps, more ranks or types of manifestation of decorativeness and expressiveness within the Low category must be used for identification of their specific style.

Much bigger number of different styles can be detected within the next two groups of maps. Conventional and Conspicuous style groups are approximately separated by presence of High values of either parameter. The main practical difference between these two groups lies in much bigger diversity of clearly different styles among the highly decorative or expressive maps.

Originality is the strongest style-defining criterion. Even though the uniqueness of visualisation is usually achieved by the use of decorative and/or expressive devices, it allows separating out not a group but a particular individual style.

Additional refining criteria, such as contrast, harmony, promiscuity etc., must be used for definition of particular styles within a group. Style can be also named after associations it activates: historical, political, social, cultural, emotional etc.

MODERN MAP STYLES

In the space formed by the above mentioned three criteria, we have tentatively identified several common map style types, that are grouped and discussed below (Table 3). They are also shown in Figure 5.1.

<table>
<thead>
<tr>
<th>Style types</th>
<th>Parameters</th>
<th>Decorativeness</th>
<th>Expressiveness</th>
<th>Originality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laconic</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Present</td>
</tr>
<tr>
<td>Constructive</td>
<td>Low to moderate</td>
<td>Low to moderate</td>
<td>Negligible</td>
<td></td>
</tr>
<tr>
<td>Expressive</td>
<td>Low to moderate</td>
<td>High</td>
<td>Negligible</td>
<td></td>
</tr>
<tr>
<td>Lighsome</td>
<td>Low to moderate</td>
<td>Moderate to high</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Aggressive</td>
<td>None to low</td>
<td>Very high</td>
<td>Negligible</td>
<td></td>
</tr>
<tr>
<td>Soft / lyric</td>
<td>Moderate</td>
<td>Low</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Antique</td>
<td>High</td>
<td>Low to moderate</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Lucious</td>
<td>Very high</td>
<td>Moderate to high</td>
<td>Negligible</td>
<td></td>
</tr>
<tr>
<td>Extravagant</td>
<td>Low to high</td>
<td>High</td>
<td>Definite</td>
<td></td>
</tr>
<tr>
<td>Artistic</td>
<td>Any</td>
<td>Any</td>
<td>Definite</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Frequent stylistic groups of modern maps

Fig. 5: Stylistic coordinate system

Conventional styles

Laconic style manifests in very simple but to some extent original graphic design along with minimised number of graphic objects and devices without additional geometrical simplification. It suits well to the maps with clearly expressed clarification function (Figure 6, a).

Constructive style is the most common example of good cartographic design practice. It means harmony between the map contents and graphic design, attractive, balanced and inobtrusive visualisation. It is emotionally neutral or slightly positive (Figure 6, b).

Expressive styles
Expressive style manifests in intense, contrasting colors and sizes of the objects, daring use of patterns and graphic effects such as lighting and shadows, lack of nuances, rhytmical composition. Objects are often stylised or even distorted in order to attract attention and stimulate perception (balanced clarification and emphasis).

Lightsome style is a version of the expressive style, specifically figurative and picturesque. It is elaborated to raise interest, evoke positive emotions and associations, always preserving the function of clarification.

Aggressive style can be seen as the extreme case of expressive style. Dissonant blatant colors immediately attract attention and often boost memorizing map information. Due to simplified, sketchy design and generally negative emotional impact it is rarely applied as a consistent visualisation manner, but often chosen to highlight the parts of advertising maps thus supporting the function of emphasis often at the expense of the clarification and signification.

Samples of expressive styles are shown in Figure 7.

**Artistic styles**

In these styles, aesthetic function usually prevails over clarification and signification.

Antique styles, that imitate the design of historical maps of different or mixed epochs, are perhaps best known of the modern artistic styles. They are is distinguished for static drawing-like visualisations, presence of additional drawings, geometric or floral ornaments, limited number of natural pale fill colors, cursive scripts or calligraphic fonts, textures of old parchment paper etc. They are mostly emotionally neutral but invoke associations with the particular period or culture.

Soft/lyric style is formed by subtle aquarelle-like gradations of colors, temperate use of gradients, shadows, elegant fonts and ornaments. Contour lines are very fine or absent as well as unnecessary map objects. For its perfect clarity, this style can be examined as the more sophisticated case of the laconic style.

Luscious style is rather rare and manifests in extensive use of different types of ornaments, mannered fonts, both contrasting colors and nuances, static composition.

Extravagant style is both very expressive and original. It creates strong impression due to unexpected composition, unconventional decorations, unusual, dissonant color schemes and original visualisation manner (for example, mystical, minimalistic, rough).

Some samples of artistic styles are shown in Figure 8.

A great variety of other artistic styles are also characterized by the originality of design, but in a more conventional manner and with different purpose than pure extravagant style. Imitations of modern ink, charcoal, or crayon drawings, paintings may be good examples.

Fig. 6: Samples of conventional styles
CONCLUSIONS
The concept of cartographic style is applicable to every type of maps, however, to a different extent. Stylistic differences are less significant among topographic and other highly standardised maps. They play a moderate role for general thematic maps and are crucial for tourist, media and advertising maps.

The authors have developed a framework for identification of map styles, based on analysis and comparison of both printed and electronic map images. Decorativeness, expressiveness and originality are the main parameters that allow to define map style. The strength of expression of each parameter in this framework can be evaluated subjectively or using a series of representative samples. In addition, any stylistic evaluation must take into account the map’s purpose, target group and media as well as possible intentional inconsistency due to specific means of graphic emphasis.

Four major groups of styles were defined by general degree of graphic enhancement of visualised data: ‘minimal’ (no enhancement, ‘standard’ (small-scale enhancement), conventional (moderate enhancement, a few sub-groups) and conspicuous (significant enhancement, a great variety of individual styles). Within the last two groups, some more concrete style types such as laconic, constructive, expressive, lightsome, aggressive, soft, antique, luscious, extravagant and artistic were outlined. They serve as principal reference areas in a hypothetical three-dimensional space of map stylistics.

Additional parameters, such as contrast, harmony, promiscuity, invoked historical or cultural associations etc., must be used for more precise definition of particular styles within a group.

REFERENCES